UTTARAKHAND OPEN UNIVERSITY, HALDWANI (NAINITAL)
उत्तराखंड मुक्त विश्वविद्यालय, हल्द्वानी (नैनीताल)

M.Sc. Mathematics
ASSIGNMENT-SECOND YEAR

Last Date of Submission: 15 May 2015 जमा करने की अन्तिम तिथि: 15 May 2015

Course Title: Mathematical Programming **Course Code: MAT510**

Year: 2014-15 **Maximum Marks : 40**

Section 'A'

Section 'A' contains 08 short answer type questions of 5 marks each. Learners are required to answers 4 questions only. Answers of short answer-type questions must be restricted to 250 words approximately.

1. Write the quadratic form whose associated Matrix is

$$\begin{bmatrix} 1 & 3 & 5 \\ 3 & 6 & -3 \\ 5 & -3 & 14 \end{bmatrix}$$

2. If a bounded variable has lower bound positive, then how it can be made zero?

3. Distinguish between pure and mixed integer programming.

4. Write the quadratic form in matrix vector notation

$f(x) = x_1^2 - 2x_1x_2 + 4x_2^2$

5. Define Lagranges multipliers?

6. Define Saddle point and minimal point of the nonlinear programming problem.

7. Define separable function. Give an example of a separable function.

8. Discuss in detail Bellman's Principle of optimality.

Section 'B'

- **Section 'B' contains 04 long answer-type questions of 10 marks each. Learners are required to answers 02 questions only.**

1. Use Branch and Bound method to solve the following integer linear programming problems.

   Maximize $z = 3x_1 + 2x_2$
   Subject to $x_1 \leq z, \quad x_2 \leq 2$
   $x_1 + x_2 \leq \frac{7}{2}$
   $x_1, x_2 \geq 0$ and are integers.

2. Solve the following nonlinear programming problem, using the method of Lagrange's multipliers.

   Max $f(x, y, z) = x\ y\ z$

   Subject to $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$

   $x, y, z \geq 0$

3. Apply Beale's method to solve the following programming problem.

   Min $f(x) = 6 - 6x_1 + 2x_1^2 - 2x_1x_2 + 2x_2^2$

   Subject to $x_1 + x_2 \leq 2$

   $x_1, x_2 \geq 0$

4. Solve the following L.P.P using dynamic programming

   Max $z = 2x_1 + 5x_2$

   Subject to $3x_1 + x_2 \leq 2$

   $x_2 \leq 3$

   and $x_1, x_2 \geq 0$